

ENGINEERING MATHEMATICS-I

[As per Choice Based Credit System (CBCS) scheme]

(Effective from the academic year 2017 -2018)

SEMESTER - I

Course Code	:	17MAT11	CIE Marks	:	40
Number of Lecture Hours/Week	:	04	SEE Marks	:	60
Total Number of Lecture Hours	:	50	Exam Hours	:	03

Course Objectives:

To enable the students to apply the knowledge of Mathematics in various engineering fields by making them to learn the following:

- * nth derivatives of product of two functions and polar curves.
- * Partial derivatives
- * Vector calculus
- * Reduction formulae of integration; To solve First order differential equations.
- * Solution of system of linear equations, quadratic forms.

Module - 1

Hours - 10

Differential Calculus -1:

Determination of nth order derivatives of Standard functions - Problems.
Leibnitz's theorem (without proof) - problems.

Polar Curves - angle between the radius vector and tangent, angle between two curves, Pedal equation of polar curves. Derivative of arc length - Cartesian, Parametric and Polar forms (without proof) - problems. Curvature and Radius of Curvature - Cartesian, Parametric, Polar and Pedal forms (without proof) - problems

Module - 2

Hours - 10

Differential Calculus -2:

Taylor's and Maclaurin's theorems for function of one variable(statement only)- problems. Evaluation of Indeterminate forms.

Partial derivatives - Definition and simple problems, Euler's theorem(without proof) - problems, total derivatives, partial differentiation of composite functions-problems. Definition and evaluation of Jacobians

Vector Calculus:

Derivative of vector valued functions, Velocity, Acceleration and related problems, Scalar and Vector point functions. Definition of Gradient, Divergence and Curl-problems. Solenoidal and Irrotational vector fields. Vector identities - $\text{div}(\phi A)$, $\text{curl}(\phi A)$, $\text{curl}(\text{grad } \phi)$, $\text{div}(\text{curl } A)$.

Module - 4**Hours - 10****Integral Calculus:**

Reduction formula $\int \sin^m x \, dx$, $\int \cos^n x \, dx$, $\int \sin^m x \cos^n x \, dx$ (m and n are positive integers), evaluation of these integrals with standard limits (0 to $\pi/2$) and problems.

Differential Equations;

Solution of first order and first degree differential equations – Exact, reducible to exact and Bernoulli's differential equations. Orthogonal trajectories in Cartesian and polar form. Simple problems on Newton's law of cooling.

Module - 5**Hours - 10****Linear Algebra**

Rank of a matrix by elementary transformations, solution of system of linear equations - Gauss-elimination method, Gauss –Jordan method and Gauss-Seidel method.

Eigen values and Eigen vectors, Rayleigh's power method to find the largest Eigen value and the corresponding Eigen vector. Linear transformation, diagonal-isation of a square matrix. Reduction of Quadratic form to Canonical form

Course outcomes:

On completion of this course, students are able to

- * Use partial derivatives to calculate rates of change of multivariate functions.
- * Analyze position, velocity, and acceleration in two or three dimensions using the calculus of vector valued functions.
- * Recognize and solve first-order ordinary differential equations, Newton's law of cooling
- * Use matrices techniques for solving systems of linear equations in the different areas of Linear Algebra.

Question paper pattern:

- * The question paper will have ten questions.
- * Each full Question consisting of 20 marks
- * There will be 2 full questions(with a maximum of four sub questions) from each module.

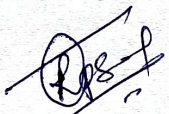
- * Each full question will have sub questions covering all the topics under a module.
- * The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1. B.S. Grewal, "Higher Engineering Mathematics", Khanna publishers, 42nd edition, 2013.
2. Erwin Kreyszig, "Advanced Engineering Mathematics I," Wiley, 2013

Reference Books:

1. B.V. Ramana, "Higher Engineering Mathematics", Tata Mc Graw-Hill, 2006
2. N.P.Bali and Manish Goyal, "A text book of Engineering mathematics", Laxmi publications, latest edition.
3. H.K. Dass and Er. Rajnish Verma, "Higher Engineering Mathematics", S.Chand publishing, 1st edition, 2011.


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